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ON THE GROWTH OF ANTLERS IN THE RED-DEER AS OBSERVED IN CONFINEMENT.

By Samuel Carter.

As you have paid me the compliment of asking me to write down my experience of keeping Red-deer in a paddock at Kensington, I now do so, although I feel some diffidence in the matter, having so little to relate.

The early years of my life having been spent amongst some of the best sportsmen in Norfolk, in what was then the business of my life, I had excellent opportunities for making observations on all kinds of game and animals connected with sport, the study of which has since helped me much in my profession of animal painter. Deer always had a great fascination for me, but as they could not be easily approached, either in parks or in the Highlands, I was unable to do much beyond studying their general appearance and beauty of movement. I therefore determined to keep some as models in connection with my studio. Having fortunately a good old-fashioned garden (one of the few left about here, with stabling, &c.), I was able to arrange my deer-houses and walks, which although limited as regards space, I found quite sufficient for my purpose, and met, I consider, with fair success. I bred eleven young deer, or "calves," as they are termed, in six years, one of the hinds being only in her first season when she came. Having arranged their walk, which was about thirty-eight feet long, with nine-foot pallisading and rough concrete floor, with drains and gratings to enable the man to wash the place down every morning, I left the surface sufficiently rough to wear their hoofs and keep them from growing too long. This is of the first importance in keeping hoofed animals, to prevent their becoming lame. A division was made in the centre, with a gate so arranged that it could be opened and shut from the outside, to separate the stag when necessary from the hinds, and also for the safety of the man when cleaning the place when the stag had his horns burnished. In each division there was a separate retreat, with straw bed, hay-rack, and water-trough, and everything was then ready for the deer, which I purchased from Mr. Herring, the well-known dealer in deer, then living in the New Road. One of the hinds being scarcely at the end of her first year, she did not breed until the second season after I had her,—that is, in her third year,—but the old hind (not her mother, by-the-bye) had a good calf, and after that each season they had a calf for five consecutive years. Whilst I kept them I gave away two yearling hinds to the Zoological Society; but I do not know what became of them, as I never saw them afterwards, and could not learn anything definite from the keeper, though I did not press my enquiry.

One fine male calf, which was born in the last week in May, 1875 (the earliest, by-the-bye, I remember), I thought I would keep, in order to see how he would turn out, and a fine deer he made, being quite the height of the old stag at the end of the first year. He had then begun to throw up his first points, which were, as usual, straight ones, and were shed at the end of the following April, or rather in the last week of that month, so that I reckoned he was then one year and eleven months old. He then commenced his first antlers, which, to my surprise, had *nine* points, when fully up at the end of July! I might, I think, have called him "a stag of ten," but the bay tine on one side was only what is called an "offer," about half an inch long. I parted with him in the following autumn to go to Richmond Park, where I hoped to see him from season to season; but I was much disappointed afterwards to find that they had been obliged to cut him, for being brought up so tame, and having lost the natural fear of man, he became too dangerous for a public park, and would attack people, and even horses in carriages, I was told. It was also unfortunate that when moving him they were obliged to saw off his horns, which they did by cutting off the brow-tines close to the burr and the beam, just above, in the usual way, and, as I was not at home at the time, the pieces were eventually lost sight of, for at that time I had no idea of writing or taking further notes on the subject, the deer having been seen by all my neighbours and many visitors to my studio. Amongst others, Mr. Tattersall, a near neighbour, saw them, and Mr. Norman and the late Rev. John Russell, both great stag-hunters with the Devon and Somerset Staghounds. I first made their acquaintance and enjoyed a good season's sport with them, when I painted the late Master of that pack, Mr. Bisset, and other members of the hunt, with a stag at bay in the Doone Valley.

Mr. Russell, I remember, was rather puzzled about the antlers, as he always held to the theory that they progressed more gradually, whilst I maintained that many of their deer which they would have were seven years old were only three or four years old, the rapid growth of the horns being due to the fact that in that country they get such good browse in the large covers of scrub-oak and other trees, as well as from the enclosures. In this way getting generally better feeding than the deer in Scotland, and having to put up with less severe winters, they are larger and have better heads at a much earlier age. This accounts for so many "warrantable deer," as they are called, being found every season, notwithstanding so many being killed the previous season.

I feel confident that the development of antler is more the result of feeding than anything else, and I think my young stag might have had "three upon top" if I had not thought it necessary, when the horns had passed the "tray" and were forming the top, to stop the supply of maize, on account of the heat in the beginning of July, and the rather circumscribed space in which they were confined, for they appeared to suffer somewhat in consequence, the walk being open to the south and very warm, although in the sleeping sheds the sun was of course kept off. There is no doubt that in some herds the deer, either from the food in their locality or from some peculiarity in their nature, grow larger horns than those in other herds. I am almost convinced that the six points indicate the proper head for a stag after shedding his first uprights, if he is a healthy animal, living under favourable circumstances, with plenty of good browse and shelter, and on a good soil—as, for example, in the better parts of Hertfordshire, which centuries ago took its name (so I have been told) from the size of "the great hertes" found there. My impression in this respect was confirmed by a gentleman who visited my studio. Being interested in deer, I told him about the young stag throwing up such a large head immediately after shedding his first uprights, and he replied that it was not at all strange, for it was a matter of keep and comfort. He then related to me an instance in which a congregation in church were surprised and somewhat alarmed (I forget whether he said it was at Balmoral or Braemar, but I think the latter) by two stags—both "royals"—walking in and down the middle aisle. It turned out that they were two that had been given as calves to the children of a farmer. Having been well nourished each threw up twelve points immediately after shedding the first uprights; but becoming then rather dangerous, were kept in a place of safety, but by some accident had been let out. I only tell this as it was told to me, and have been trying in vain to recollect the name of my informant.

As to my own experience, there are a few things I have noticed about deer which may be worth mentioning. It was an invariable rule that when the hinds had shed their winter coat and assumed their clean bright summer dress, you might in a week, or ten days at the outside, expect the fall of the calf, and it was the same with my Fallow-deer. But in noticing recently the Wapiti in the Zoological Gardens, I was surprised to see that (although each had a fine calf about a month old) the hinds were still shedding their old coats, and that only on their legs, face, and ears had the clean summer coat; they had got rid of the long winter coat, but still their bodies were covered with the shorter winter hair still falling off.

Another point I have remarked is the difference in the colour of deer, and especially in the eye. Some are much lighter coloured than others, and have an eye with a straw-coloured iris; others have a dark brown eye and the red of the bodies and the browns and grey about the face, neck, and legs much darker in tone. So far as my experience goes, I am of opinion that the dark deer belong to the Highlands and Islands of Scotland, and the light-eyed deer of a lighter and more mealy colour belong to the parks and lowlands, being also larger and partaking more of the character of the continental deer. I have noticed that Sir Edwin Landseer painted the dark eye, which he may have selected because it came in better from an artistic point of view, or because he always painted Highland deer.

My stag was aged when I first had him, and was peculiar in having odd eyes, one straw-colour, the other light blue. He was a good stag, however, rather short and thick-set, and what I call "mealy-faced." The two hinds were darker in colour, especially the younger one, with fine rich brown eyes; the calves took after them, and the young stag had the rich brown eye, like his mother, the largest hind. When quite young, with spotted coats, they were so like the young Wapiti now in the Zoological Gardens that I could not help being struck by the similarity, apart from size. The young Wapiti, as a rule, are darker about the face, ears, and eyes, but not more so than the young of my small dark hind; and it is curious that the difference between the Wapiti and Red-deer developes as they advance towards maturity.

I am surprised that deer are not more often kept, for they are very beautiful when viewed behind nice pallisading, and appear perfectly happy. They do better in a limited place such as mine than if they had a small run of grass, which only gets into a bad state, spoils their feet, and affects their general health. I think, moreover, my deer were also more contented at not having too extensive a view, but only a few trees and shrubs in front of their walks. I am certain this would be a good plan in breeding fresh stock for forests. The dry food which I gave them was hay and maize, with an occasional change to oats; and for moist food I found golden-globe mangolds the best, for I have kept these roots stored in the outhouse all through the winter to the end of June, and still good. This could not be done with swedes, and the mangolds contain more moisture. In summer I gave green tares, and grass from lawns where it could be got clean.

Besides the Red-deer I also kept a Fallow buck and four does, which did equally well, but were not so pleasant to keep, for they quarrelled so—not so much between the buck and does as between the does themselves, which were constantly chasing and biting each other.

Both the calves of the Red-deer and the Fallow fawns used to come out through the railings and lie by themselves in the garden, and only went to their mothers for nourishment, except at night for protection. The only accident which happened was one killed by a large cat. It was one of the Fallow fawns, and hearing it crying I went out, and caught the cat on its neck. As he would not retreat more than a yard or two, I brought out my little rook-rifle and shot him dead. It was the more astonishing because this occurred when the fawn was more than two months old, and a fine strong, well-grown one. It was not quite dead when I arrived, but so injured that it could not stand, and being a good deal torn, I thought it better to put it at once out of pain. It was lucky they were not attacked in this way when younger, for they were generally out in the garden, and at times it was a pretty sight to see them playing on the grass-plot—three Fallow fawns and two Red-deer calves. But they soon became bad gardeners, for they used to send the plants flying in their races over the flower-beds as they became stronger, and had to be kept in by wire-netting outside the iron pallisading.

I have omitted to state that my old stag never had more than eleven points, and one of them only an offer on one of the tops; but I believe him to have been a very old stag when he came. For the last year or two the tines were straight and flat, and lacked the vigour of the curve. He might also have become a "royal" if I had not been obliged, or thought it necessary, to stop a good deal of the food in hot weather, just as the tops were growing, because they used to stand and pant from the heat, as the walk was without a roof and full in the sun, and in their houses it was also very warm, so that both deer, I consider, had the growth of horn checked. I have the old stag's head preserved, with his ten points; but he was going off from the time I had him, although always a heavy deer.

REPORT ON THE GROUSE DISEASE.*

By E. Klein, M.D., F.R.S.
Lecturer on General Anatomy and Physiology at the Medical School of St. Bartholomew's Hospital, London.

The disease which during the spring and summer of the present year prevailed amongst the Grouse on the moors of Ayrshire and Cumberland is, according to the account given to me by the keepers on the various moors, the same which visited those parts during 1882 and at previous periods. The disease, during the present year, commenced on all these moors about the end of the first and during the second week of April, and lasted in a severe form until the end of May. During June it greatly diminished, and by the middle of the month, although in every one of the moors visited there were birds still affected, the disease had so much abated that it may be said to have practically come to a close. But I am sorry to say that this standstill seems to be due, in some degree, to the fact that most of last year's birds had been almost cleared out by disease. At any rate, on some of the moors few healthy old birds could be met with.

The symptoms of the disease in Grouse during the present year are the same as those noticed in previous epidemics, and I think there can be little doubt also that during this year it is the typical and well-known "Grouse disease." All the keepers of the moors visited are unanimous on this point. The birds affected with the disease show the loss of feathers on the legs, the darker colour of the plumage on the back, the hoarse voice, and the sluggish abnormal flight. The birds seek the water, and when dead are generally found near or at the burnside or other water, loch or drain, on the moors. The diseased birds which I have examined—and this agrees with the accounts given by the various keepers, as well as by other observers—differ in this, that some die in a plump, others in a wasted condition.

The moors which I visited, and on which I examined diseased birds are:—(1) Waterhead Moors, near Cumnock, rented by Mr. L. Marshall and Mr. S. Grant; keeper, J. Sargent. (2) Craiglure Moors, near Maybole, belonging to the Marquis of Ailsa; head keeper, Mr. Cox; under keeper, Macdonald. (3) Kilkerran Moors,

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* From 'The Field' of July 23rd, 1887.

Kilkerran, belonging to Sir James Fergusson; keeper, Shiels. (4) Blairquhan Moors, rented by Mr. G. Bailey Worthington; keeper, Tolmie. (5) Stellshaw Moors, belonging to Sir Frederick Graham; keeper, Alexander Crow. (6) Flat Moors, rented by Mr. Carter Wood; keeper, James Crow. (7) In addition to these I examined a diseased bird sent from Peeblesshire.

1. Waterhead Moors.—Few diseased birds to be met with. The keeper shot a cock bird, which, by its dark plumage on the back, its sluggish flight, and its legs bared of feathers, was diagnosed as distinctly diseased. The bird was in a slightly wasted condition. The *post-mortem* examination was made about three hours later. The middle portion of the small intestine, and both the cæcal appendages, contained numerous tæniæ or tapeworms. The small intestine and cæcal appendages showed three perforations, evidently recent, and produced by shot. Through these perforations some tapeworms were protruding. The liver was much congested, and of a dark greenish colour. The second bird shot on these moors was a hen bird, in fairly plump condition. The *post-mortem* examination was made about three hours afterwards. The peritoneum looked normal, except some patchy redness in the small and large intestines. Several recent perforations were noticed on the small intestine and cæcal appendages; from their nature they were probably caused by shot. Numerous tapeworms were found protruding from the small intestine, and extending freely into the peritoneal cavity. The mesentery, the parietal peritoneum, and the under surface of the liver, were covered with a layer of thick sanguineous exudation. The liver was much congested and of a dark colour. The kidney was also congested.

2. Craiglure Moors.—After a prolonged search, lasting several hours, we got a diseased cock bird, which was shot by the keeper. The bird was in a plump condition. The peritoneal cavity was normal. The whole of the lower half of the small intestine contained numerous tapeworms. There was patchy congestion in many places in the wall of the small intestine. The liver was congested and of a dark colour; the kidney appeared slightly congested.

3. Kilkerran Moors.—After several hours' search, during which time a fair number of healthy birds were met with, we came across a diseased cock bird, which was shot by the keeper. The

bird was in a thin condition; bare on chest, abdomen, and legs. The *post-mortem* examination was made about two hours afterwards. Along the small intestine, which contained numerous tæniæ, there were several recent perforations, some minute, others larger, probably produced by the shots. Blood clots were found in the abdominal cavity; these had probably been caused by injury to a large vessel. There was sanguineous exudation on the mesentery, on the parietal peritoneum, and on the upper surface of the liver. Numerous tæniæ were protruding from the small intestine into the peritoneal cavity, several whole tæniæ and several small pieces of them being free in the peritoneal cavity. The liver was congested and discoloured.

4. BLAIRQUHAN MOORS.—Two diseased birds were examined; they were shot by the keeper. One was wasted, and to all external appearance, was considerably advanced in disease. On opening the abdominal cavity, the parietal peritoneum, the mesentery, and the serous covering of the intestines were found greatly inflamed and covered with sanguineous exudation; so was the external surface of the liver. The middle part of the small intestine showed several perforations, probably all produced by shot, tæniæ protruding from its cavity into the peritoneal cavity; in the latter were numerous tæniæ. The liver was large and much discoloured; the lungs and kidneys congested. The second bird was, to external appearances, less diseased, and in a fairly plump condition. The peritoneum looked healthy, but the small intestine showed patchy hyperæmia in several places. At one of these places the wall of the intestine was particularly congested and considerably thinned out, so that it required little for a perforation. The whole small intestine was much distended by numerous tæniæ, more than a dozen heads being noticed. The liver was congested and discoloured.

5. STELLSHAW MOORS.—Numerous adult healthy birds were seen, and numerous healthy and strong young ones. This was the only moor where one might say there was a fair stock of Grouse. During the whole day we came across only one cock bird that could be considered, from external appearances, to be in a diseased condition. It was shot, and found in a fairly plump state. The peritoneum was healthy; the small intestine contained numerous tæniæ, and showed in different parts congested patches. The liver was congested, and slightly darker in colour than normal.

6. Flat Moors.—The first bird that I examined was brought to me by James Crow, the keeper, who found it in a dying condition. The *post-mortem* examination was made one hour later, death having by this time ensued. In the peritoneal cavity there were found free several big clots of blood, and also a little of serous fluid; close to the left kidney were lying several blood-clots and a mass of tapeworms. These were protruding through a hole in the middle part of the small intestine, into the cavity of which the hinder portions of these tæniæ could be traced. The small intestine showed at and near this perforation congested patches. The liver and lung were congested, particularly the former, which was of a dark green colour. The kidney was in a state of extreme congestion, particularly the right kidney, on which some big venous branches were found ruptured, and from them blood was exuding. The second bird examined was a cock bird; it was shot because, from external appearances, it was considered by the keeper to be in a distinctly diseased condition. The animal was fairly plump. The peritoneum was much inflamed, particularly the parietal layer on the right side and the serous covering on the intestines; sanguineous, thick exudation on mesentery, and in right hypochondrium. The small intestine, in its middle portion, was much distended by tæniæ, and on one place opposite the right kidney there was a place noticed where the wall of the intestine had become much thinned out and ready for perforation. In addition to these birds, the keeper caught two living hen Grouse, which seemed to all appearances to be in a diseased condition. Both had the external signs of disease on them, but were in a fairly plump condition. They were brought to London in a living state. One was killed, the other died after two days. The *post-mortem* examination of the first showed patchy redness of the small intestine, the liver of a darkish colour. Numerous tæniæ were present in the small intestine. The second bird showed the congestion of the small and large intestines very pronounced, and the same was observed on the pancreas. The organ was much infiltrated with blood; the liver was enlarged, much congested, and of a dark greenish colour. The small intestine contained only a few tæniæ.

7. Through 'The Field' office I received a bird, which was sent from Broughton, in Peeblesshire. The bird, when sent off by the keeper, was still living, but it died *en route*. When

I examined it, the day after, it was in a fairly good condition of preservation. The small and large intestines showed a good deal of congestion, the mesentery was inflamed, and there was a small quantity of fluid sanguineous exudation in the peritoneal cavity. The kidney showed great congestion, so did the lung; the liver was much congested, and of a greenish black colour. In the small intestine were numerous tæniæ. At one of the congested points of the small intestine, the wall of the intestine was very much thinned out and almost perforated.

From these observations it follows that all birds examined showed, as the most constant anatomical symptoms, the congestion of some parts of the intestines, the great congestion and discoloration of the liver and kidney, and in some cases also of the lung. In some cases the peritoneum was inflamed, and there was more or less inflammatory exudation in the peritoneal cavity. Extravasation of blood from the kidney was observed in one bird that had died spontaneously of the disease. In all the birds tæniæ (*Tænia calva*) were present in the small intestine, in some in great numbers; in one bird that died spontaneously only a few examples were noticed.

Unmistakable perforation of the intestine was noticed in one bird that had died spontaneously of the disease (from Flat Moors), and in another bird (from Broughton), also dead spontaneously, the intestine was on the point of perforation. The perforations noticed in some of the birds that were shot must be left out of consideration, since the nature of the perforation was not incompatible with having been caused by shot.*

Comparing these observations with those of previous investigators, we find, then, that they harmonise to a great extent with those recorded by Dr. Andrew Wilson in the 'Edinburgh Medical Journal,' and quoted by Mr. D. G. F. Macdonald in his book on 'Grouse Disease,' p. 145. Mr. Wilson noticed in the birds dissected by him a markedly congested state of the digestive and respiratory organs. Prof. Jeffrey Bell, in 'The Zoologist' for July, 1887, p. 265, noticed in some specimens a marked inflammation of the walls of the intestine, in others a congested state of the liver.

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* The presence of tæniæ, whole and short pieces, found in some of the birds examined by me is easily accounted for by remembering that if a perforation of the small intestine takes place (by disease, as in one of my birds, or by shot, as was most probably the case in several of the birds examined), the tæniæ present in the intestine, by their known power of rapid contraction, would be able to pass out into the peritoneal cavity; this need not take more than some minutes.

In 'The Field' of December 6th, 1873, p. 593, there is a reference to a passage printed in the 'Oriental Sporting Magazine' of January, 1829, and copied from the 'Greenock Advertiser,' so that it was probably first published in 1828—that is to say, sixty years ago—to the following effect:—

> "Having heard a great deal said about a destructive disease spreading devastation among the moor game of this district, we have taken some trouble to inquire into the truth of the report, and, having ascertained it to be correct, we afterwards caused some inquiries to be made into the nature of the malady. From Mr. Wallace, a well-known adept in sporting matters in this immediate neighbourhood, several Grouse, in a state of complete emaciation, were sent to town. These were carefully dissected by one of our medical friends, and the disease found in all of them to be tapeworm. It is quite astonishing to observe the extent to which the disease can exist in the feathered tribe before causing death. . . . . Some years ago, when a similar disease was prevalent, Mr. Wallace caused many specimens to be examined, and in some of them life had been protracted in the animals even after the worms had penetrated the intestines, twisted round their outer coats, and produced such extensive suppuration in the cavity of the abdomen, that the intestines literally floated in pus or matter."

Now, the question presents itself, What is the cause of these anatomical lesions? It is well known that there are a good many theories concerning the cause of the Grouse disease; they have very ably been put together and analysed by Mr. Macdonald in his book on Grouse disease, quoted above. Of these theories three deserve special reference:—The first of these was put forth by Dr. Farquharson, who maintained—without, however, adducing any definite facts to prove it—that Grouse disease belongs to the category of infectious diseases. The second view is that advanced by the late Prof. Cobbold, to the effect that *Strongylus pergracilis* in the intestine is the cause of Grouse disease. And the third view may be considered contained in the passage quoted above from the 'Greenock Advertiser' of 1828. Other theories, such as overstocking, inclement season, insufficient and bad food, &c., are more or less of the nature of secondary influences, such as are known in other infectious diseases to increase or decrease the susceptibility and spread of the malady, but cannot be regarded as the *causa causans*.

The first theory supposes the existence in the diseased animals of a hypothetical virus, which, by its multiplication within the organism, sets up the symptoms and phenomena of the disease. This virus, when finding access to a healthy bird, would here again multiply and produce the same disorder. In many infectious diseases the virus has been definitely shown to be some low form of life, generally belonging to the group of species of Bacteria. Some of these species have this great character, that they can live, thrive, and multiply within the body (in the blood and tissues) of certain species of animals, and by their chemical action, or otherwise, therein produce a definite group of symptoms characteristic of the particular disease. When they or their offspring find access to a new susceptible body, they again multiply herein, and set up the same diseased state. Thus some of the infectious or communicable diseases have been proved to be caused by a definite species of microbes, differing in the different diseases. They are known as pathogenic microbes, and they are distinguished from other non-pathogenic species of microbes—though both are similar in morphological respects—in this important particular, that the latter have no disease-producing or pathogenic power—*e. g.*, some species of microbes associated with fermentative and putrefactive processes.

The methods generally employed for the study of pathogenic microbes are these:—(1) The blood or tissues, or both, of an animal affected with an infectious disease should, as a first condition, contain some definite form of microbes discoverable by the microscope; (2) these microbes, taken from the blood or tissues of a diseased body, when transplanted on to various artificial nutritive media, multiply thereon, and thus produce new crops; (3) the microbes of these artificial crops, or those taken directly from the diseased tissues, when transplanted (by inoculation or otherwise) into a healthy susceptible animal, set up the same disease as that from which they are derived; and (4) in the animal thus infected the same species of microbes must be found to exist in the diseased tissues.

Accordingly (1) I made a careful microscopic study of the blood and diseased tissues (liver and kidney) of Grouse dead of the disease. Three birds were examined:—(*a*) the one sent from

Broughton, and mentioned above, No. 7; (*b*) the bird that was found in a dying condition on Flat Moors, and mentioned No. 6; and (*c*) the bird that I brought to London with me, and that died here after two days. In no instance have I been able to discover the presence of a definite form of bacteria. Numerous microscopic specimens were examined of the liver and kidney, and the blood; they were prepared by the methods used for the microscopic study of bacteria (staining with certain aniline dyes), but no kind of bacteria was discoverable. (2) I have made a large number of cultivations of blood on artificial nutritive media (nutrient gelatine, Agar Agar mixture, &c.), such as are used for this purpose in bacteriological investigations, but I have not been able to obtain any growths. I was therefore forced to conclude that, with our present means, no bacteria can be discovered as having anything to do with the Grouse disease.

I directed my attention then to the second theory, that advanced by Prof. Cobbold. The three birds which I used for the bacterial investigation, and also the others examined, contained no strongyles in their intestines, and therefore Cobbold's theory was not applicable to our Grouse disease.

The third theory above mentioned, namely tapeworm and perforation of the bowels, did seem to a certain extent to harmonise with the observation made by myself, and recorded in a former paragraph. And I confess it was this theory which I provisionally accepted while in Ayrshire. But after I returned to London, and after I had an opportunity of dissecting the two deceased birds caught in Cumberland—one of which died two days afterwards in London—and found no signs of perforation of the bowels, and, moreover, in one bird only very few tapeworms in the intestine, while the intestines, liver, and kidney showed such marked signs of disease; and further, when I found that Mr. Crisp had stated some years ago, in the 'Pathological Transactions,' that he had dissected several birds not dead of the disease, and that he found in them numerous tapeworms; and finally, taking into consideration that many competent anatomists had dissected birds dead of the disease, but had not noticed any perforation of the bowels, I had to give up this theory of the tapeworm being the cause of the Grouse disease.

I will also state that the tapeworm theory always presented to me this serious difficulty, *viz.*, how to reconcile with it the diseased state of the liver, which I described in a previous paragraph. As a matter of fact, most of the keepers were firm in the belief that, in all birds dead of the malady this year and in previous years, the liver was found, on opening the animal, in a diseased condition. Others who have had experience in these matters, like Mr. Bailey Worthington and others, were of the same opinion.

The fact that in the two diseased birds which I brought to London, and in which the peritoneum was to all appearances sound, but the liver and kidneys, particularly the former, in a pronounced state of disease, presented an insurmountable difficulty, and I may say, in consequence, I altogether abandoned the theory of tapeworm.

Thus, except having learned from my own observations the nature of the pathology of the diseased birds, I had to confess the *status quo ante*.

This being the state of matters, and seeing that the liver is the organ most constantly and distinctly affected, it was necessary to examine this organ microscopically in order to study more carefully the nature of the affection. Two things seemed to me to deserve special attention. In the first place, there can be no doubt that the theory that Grouse disease belongs to the group of infectious or communicable diseases best harmonises with the general pathology above described, and the manner of the spread of the disease, as observed in this epidemic and in former years—*viz.*, that the disease, having made its appearance in a particular locality, gradually sweeps, as it were, over the whole of this and the adjoining districts; further, that the disease, manifesting itself at first in isolated cases, soon becomes epidemic, and then again gradually declines in frequency.

Secondly, the question of some species of bacteria being the cause of the disease could not be answered in the affirmative. But it was still possible that some other kind of fungus was the cause of the malady, and in this case ought to be discovered in the liver. In connection with this, it is necessary to bear in mind that not all communicable diseases are due to bacteria. Amongst these I may mention various forms of Protozoa, *Amœba coli* and various Psorospermia (*Coccidium oviforme* in rabbit's liver); then there are various higher Fungi, *Favus fungus*, *Aspergillus flavus*, *fumigatus*, and *niger;* then several species of Mucorinæ, all of which are known to be pathogenic to man and animals; then

Actinomyces in cattle and man; and lastly some forms belonging to the group of low Fungi known as Mycetozoa, Mixomycetes, or Plasmodia. In this connection may be mentioned the important discoveries of Marchiafava and Celli on the cause of intermittent fever or ague. These observers have shown the existence, in the blood of persons affected with ague, of certain forms of plasmodium, and these are probably the cause of the disease; and recently also Dr. D. Cunningham, of Calcutta, found in the tissue of the so-called "Delhi sore" (a cutaneous disorder in India), a form of plasmodium.

Now, a careful examination, after my return from Scotland, of microscopic sections of the liver of Grouse dead of the disease, showed the existence, in the capillary blood-vessels and also in large branches of the veins of the liver, of numerous objects which do not belong, and are foreign to the normal liver tissue, as well as to the blood, or any other tissue of the bird. In suitably prepared specimens (hardening in alcohol, staining of fine sections in methylene blue), every capillary blood-vessel, or at any rate the spaces between the streaks of liver-cells usually occupied by capillary blood-vessels, contain certain corpuscles, which are about two to four times the diameter of the liver-cells, and of the white blood-corpuscles. The bodies in question are present in very great numbers, and are of various shapes—some cylindrical, others spindle-shaped, some are irregular and with one or more processes, while others are irregularly elongated; each consists of a hyaline protoplasm, in which one or two oval nuclei are occasionally noticed; but most of the protoplasm of the corpuscles is filled with spherical or irregular coarse particles. The protoplasm does not take the stain, while these particles are deeply tinted. The impression these bodies give one is that they are some form of plasmodium, arrested by the hardening re-agent in one or the other phase of amœboid movement, such as is shown by plasmodium, There can be no question about these bodies, they are present everywhere in the capillaries of the liver. I have seen them also in most of the larger branches of the veins of the liver, and here I have also met with forms which very well harmonise with this view—*viz.*, some forms spherical in shape, smaller than the above, and inclosed in a distinct capsule; they would correspond to the spores of plasmodium. Further, nucleated corpuscles with uniform protoplasm were noticed differing from white blood-corpucles in size and aspect; they were in groups of three or four, and more or less in the process of coalescence, such as is known to take place with the swarm-cells, derived from the germination of the spores, in order to form a plasmodium.

That the presence of these Fungi in the blood-vessels of the liver would at once readily explain the diseased condition of the liver, is obvious. As to the inflamed condition of the peritoneum noticed in some cases, this would follow the congested state of the liver; and the same applies to the congestion, inflammation, and even perforation of the intestine observed unmistakably in two cases that had died spontaneously of the disease; for the extreme congestion of the veins of the liver might easily produce that state, since the venous system of the intestines discharges into the hepatic portal system. But the same Fungi may be also present in the vessels of the intestine, and thus directly produce the abnormal condition of this organ; but this I have not yet inquired into.

At any rate, it will be necessary to study these bodies in the fresh and living state, which I hope soon to be able to do; and further, their distribution in the diseased animals, the distribution of them and their spores on the moors, and the mode of entrance into the birds, will have to be carefully gone into. It is evident that on such studies will depend all preventive measures. So much I will assert at present, that there exists in the liver of diseased birds large numbers of corpuscles which are foreign to the liver tissue, and which in all respects correspond to some form of low Fungi, most probably to Plasmodia.

In conclusion, I wish to offer my best thanks for the kind help and co-operation which I received from Sir Frederick Graham, Bart., Mr. J. Bailey Worthington, and Mr. Leonard Marshall. I have also to thank the following keepers:—James Sargent, of Waterhead Moors, Cumnock; head-keeper Cox and keeper Macdonald, of Craiglure Moors; head.keeper Shiels, of Kilkerran Moors; head-keeper Tolmie, of Blairquhan Moors; James Crow and Alexander Crow, of the Flat and Stellshaw Moors respectively.

ON THE BREEDING HABITS OF THE SISKIN, AS OBSERVED IN THE Co. WICKLOW.

By Allan Ellison.

Having observed a pair of Siskins, *Carduelis spinus*, near Shillelagh, in 1885, as late as May 29th, I was led to conclude that this species probably nested in the neighbourhood. Subsequent observation has enabled me to prove beyond question that it does so regularly, and in at least one locality (the Coollattin woods) far from uncommonly. I have also noted the curious fact that while in most parts of the country the Siskin is scarcely known, except as a winter visitor, the reverse is the case about here. In spring and summer it is one of the most attractive small birds in our woods, and passes into the open fields in early autumn, when both old and young form small parties of from six to twenty birds. From November to the beginning of March, however, it is rare, appearing only at uncertain intervals and in small numbers, apparently never remaining near one place for any length of time.

On the few occasions when I have seen Siskins during winter it has been almost always on the wing, flying very high and seldom alighting, as if this locality afforded no attraction at that season of the year. About the beginning or middle of March they reappear in flocks, and immediately resort to their breeding haunts—the pine woods. In early spring Goldfinches and Lesser Redpolls associate with them in considerable numbers, the three species traversing the pines and alders in company, in search of food. As the season advances the Goldfinches and Redpolls leave the pine woods and depart to their own breeding haunts in the fields and hedges.

From what I have observed here it appears that the Siskin, although resembling the species just named in habits, differs from them in rearing two broods instead of one in the season. It also builds its first nest a good deal earlier than other birds of the same group. Of four Siskins' nests which I have discovered this year the first one contained young ones several days old on April 29th—a date on which several of the *Fringillidæ* have not even commenced to build. I have noticed many young broods of Siskins on the wing by the third week of May or even earlier.

The first occasion on which I discovered a Siskin's nest was on May 21st, 1886, as announced in 'The Zoologist' for that year (p. 489). This nest was built near the end of a branch, at the top of a large Scotch fir, but was plundered either by Magpies or Squirrels shortly after the eggs were laid. With great difficulty I succeeded in securing the nest itself by cutting off the branch, and gave it to Mr. A. G. More for the Science and Art Museum, Dublin.

This year I determined to watch the Siskins closely, and to make every effort to discover some more nests, to obtain the eggs, and to find out as much as possible about the habits of the birds and their distribution during the breeding season. The result has been the discovery of four nests, two of which I obtained with the full complement of eggs. The first nest above mentioned contained five young on April 29th, and was situated in a small Scotch fir, very near the top, at the insertion of two of the lateral branches. On May 12th two young Siskins were fully fledged and left the nest.

As I was particularly anxious to obtain the eggs, this nest was rather a disappointment to me, but knowing that there were many pairs of Siskins near the same part of the wood, I continued my search in the neighbourhood of the first nest. I had seen a pair of Siskins about a Douglas fir, and had noticed the hen bird returning several times to a certain spot on a branch, which made me suspect that she had selected it as a building site, though the nest was then not yet commenced. I revisited the tree on May 4th, several days afterwards, when I found the nest completed. It was near the top of the tree on a lateral branch, some distance from the main stem. On the 10th five eggs had been laid, and the nest and eggs were then safely secured.

I subsequently discovered two more nests, both on May 24th. One of these was built at the top of a tall lichen-covered spruce-fir, against the main stem, and contained one young bird about half-grown. The other nest, the fourth which I found, was situated in a tall larch, near the end of a long lateral branch some twenty-five feet from the ground, and when found had only just been commenced, but must have been finished within two or three days, for when I took it with five eggs, on June 3rd, the eggs were already incubated. As may be imagined from its position it was no easy matter to reach this nest; but I succeeded by fastening up the branch with a rope, so that it could not bend or break as I made my way out along it.

All the Siskins' nests I found this year were in Coollattin woods, the locality where these birds abound in summer; but that discovered on May 21st, 1886 (Zool. p. 489), was at a place called Ballard, beside the Derry, two miles farther down the valley. I know that Siskins have been breeding at this latter place this year also, as I have observed both adult and young birds there.

The dimensions of the nest now before me are:—External diameter, about 3½ in.; internal diameter, 1¾ in.; depth, 1½ in. The foundation and outer structure are composed of small dead spruce twigs, while the walls of the nest are chiefly formed of green moss, with fine roots around the margin, the whole being bound together with wool, and smoothly lined with fibrous roots, wool, horsehair, and a few feathers. The eggs are almost equal to those of the Goldfinch in size, or very slightly smaller; of a pale bluish green, nearly identical with the ground colour of a Bullfinch's egg, and with small specks of subdued lilac and a few larger spots and dashes of deep purple and reddish brown. In some the darker spots are nearly or entirely absent.

The young Siskins appear to be fed partly on Aphides, for while watching the parent birds carrying food to them I have observed that they gathered it from the leaves and green shoots of the alder trees, which nearly always swarm with Aphides, as anyone can testify who has made his way through an alder thicket in early summer, the offensive insects falling down from the branches in showers at the slightest touch.

I know no birds so interesting and varied in their habits as Siskins. Their extreme restlessness makes them very difficult to watch, for they seldom remain near the same spot even for a few minutes at a time. They particularly affect the tops of large fir trees, the highest point of the tallest spruce-firs being their favourite resting-place. From such a point of vantage their call-note, which is loud and clear, resembling the word "glee," is constantly repeated. This call sometimes so nearly resembles that of the Coal Titmouse as to be indistinguishable from it, except by a practised ear, especially as the two species frequent the same trees, and are often found in company. The male Siskins are most indefatigable and pleasing songsters, and the song is uttered from a branch, or tree top, as well as on the wing. Frequently whilst singing the bird may be observed to dart from its perch with an upward and somewhat circular flight, after the manner of a Meadow or Tree Pipit, and after describing a curve to realight at a little distance. But there is this difference, that while a Meadow Pipit sings but once during its flight, the Siskin often repeats its song several times before alighting, but always changes the direction of its flight each time that it recommences its song. This manœuvre is always accompanied by a wavering and desultory motion of the wings, as if the bird was wounded and scarcely able to fly—a peculiar habit which is exhibited by the Greenfinch also in the pairing season. These flights are often many times repeated within a few minutes, especially in the neighbourhood of the nest, and while the female is occupied in building. The song itself seems to include notes of almost every other small bird, but I do not think it likely that the notes are in reality borrowed. Sometimes it assumes a considerable resemblance to that of the Chaffinch, but is rather harsher and more prolonged. Then, again, the bird will sing almost without a pause for some minutes together, introducing sounds which resemble the notes of the Sedge Warbler, Sky Lark, Goldfinch, Redpoll, Sparrow, and many other birds; but the most characteristic part of the whole is a prolonged creaking note, with which the song generally concludes. This is a sound which once heard is not likely to be soon forgotten, or mistaken for the note of any other bird. It is one of those strange bird-sounds which, like the "drumming" of the Snipe, the "churr" of the Nightjar, or the "trill" of the Grasshopper Warbler, are difficult to describe. Another note, which is not so often heard, is a soft chatter, which the bird generally utters as a call to its mate or companions when about to take flight.

The male Siskins differ considerably in colour, some being of so bright a yellow as to resemble Canaries, the throat being jet-black, while others are greener and more dingy, the black on the throat being nearly or entirely absent. These last are evidently younger birds.

ON THE NESTING OF THE TUFTED DUCK IN KIRKCUDBRIGHTSHIRE.

By Robert Service.

The Tufted Duck has of late years been gradually extending its breeding range in the British Islands, though I am not aware that its greater abundance or wider distribution in the winter months has been noticed in print.

Whatever may be the case elsewhere, it is certain that in this district Tufted Ducks are far more frequently observed now than they were previous to (say) 1880. Until about that period I very seldom ever saw it, and only in certain favoured localities. Since then it has become comparatively common, and may be observed singly, or in small parties of half a dozen or more, every winter on almost all the lochs of this district.

I cannot say that any corresponding increase in number has been noticed on the Solway Firth. On the Kirkcudbrightshire Solway it is very uncommon. Mr. Armistead states ('Naturalist,' 1886, p. 72) that he has seen two which were killed on the Firth, but that it is decidedly rare. In reference to this remark the Rev. H. A. Macpherson subsequently wrote (p. 150) that "The Tufted Duck is fairly common on the upper parts of the Solway." Owing to the different meanings evidently attached to the word "Solway," we are left in doubt whether the actual waters of the Firth are meant or not. The authors of the 'Birds of Cumberland' characterize it as "a winter visitant, constantly present with us from November to April, and tolerably plentiful near the Solway, being less frequently met with far inland."

There is a prevalent idea amongst sportsmen here that it is one of the hard-weather fowl, and perhaps formerly this notion had some foundation, but for several years past this duck has made its annual appearance in winter in considerable numbers, quite irrespective of weather. Sir Wm. Jardine has remarked:—"On the Solway we have observed it in a much less proportion [than the Scaup], and only in small parties together. Its describers consider it more lacustrine than the Scaup, and we have frequently shot specimens in the Annan, fifteen or twenty miles from the sea; the weather, however, was always severe when this bird appeared" (Brit. Birds, vol. iv. p. 143). Much the same opinion has been expressed by Gray and Anderson in relation to the Tufted Duck in two of the neighbouring counties:—"Strictly a winter visitant, frequenting the open sea in fine weather, and coming up the larger rivers during storms" ('Birds of Ayrshire and Wigtonshire,' p. 46).

In all the references to this bird in our own and neighbouring districts, no observation is made of its increasing frequency in winter, nor—except where a hope is expressed by Messrs. Macpherson and Duckworth (*op. cit.*) that it may yet be found breeding in Cumberland—is there any allusion made to its nesting.

Last year I observed two pairs of Tufted Ducks frequenting Lochratton, a loch a few miles west of Maxwelltown, during May and June, and there is a strong suspicion that at least one of the pairs nested, but I could not obtain any satisfactory proofs of it. On the 23rd May of last year I saw a pair of Tufted Ducks on Loch Ken. This year there were three of the same species on Preston Merse, below Southerness, on May 15th; and during the past breeding-season I have made frequent visits to Lochratton for the purpose of observing a couple of pairs of Tufted Ducks which again remained about the Loch after the other Tufted Ducks, Goldeneyes, and Pochards had left. On the 24th May their actions plainly showed them to be preparing for nesting. Several days afterwards only one pair remained, and these were seen together frequently till nearly the end of June. On July 2nd I saw the male only, the female evidently having commenced to hatch, but the place being strictly preserved whereon the nest was likely to be, no attempt was made to find it. On the 21st July the female appeared out on the Loch surrounded with a brood of eight young ones, which at a little distance looked quite black. They were a few days old, so they had been hitherto concealed amongst the reeds, or they may have come down one of the burns.

A week later I again saw them, but in the interval they had decreased to five, the three missing ones having probably been taken by Pike, with which the Loch abounds. We approached in a boat to within less than ten yards before the mother duck, thinking her safety compromised, rose and spluttered along the water, feigning inability to fly properly till she was forty or fifty yards off, when she sat down on the water pecking at her feathers, and trying to look quite unconcerned, but every now and then uttering a guttural sound like "kuruk," casting a glance back to where the young ones were diving incessantly, in a vain and most absurd-looking endeavour to hide themselves. She several times flew back to within eight or nine yards of the boat, and repeated the same manœuvres as before. When we left the place, she gathered her brood round her, and made off quickly to the shelter of the reeds.

It is satisfactory to add that this first recorded instance of the breeding of the Tufted Duck in the Stewartry of Kirkcudbright has been well authenticated without infringing the Wild Birds Protection Act by taking the life of any of the birds in question.

NOTES AND QUERIES.

To purify Water in an Aquarium.—There is an easier method of keeping pure the water in a small aquarium than the chemical plan suggested at p. 292. No doubt the snails do good scavenger work, but the important point is to keep the water charged with ordinary atmospheric air. This can be done by the use of an ordinary pair of bellows for a few minutes twice or thrice a day. There is no mistaking the pleasure with which the fish receive a good blowing up.—T. Cornish (Penzance).

MAMMALIA.

A Herd of Red-deer from a single Hind.—The following information, derived from letters addressed to Professor Flower by Mr. J. A. Houblon, of Hallingbury Park, Bishop Stortford, has been kindly placed at our disposal for publication in 'The Zoologist':—"A Red-deer hind was hunted by Mr. Petre's hounds into this neighbourhood and lost in 1875. I was walking soon afterwards through the Forest (Hatfield Broad Oak) when I saw the hind with a male calf at her foot. Since 1877 she has had one calf every year, except one, though no stag, except her own offspring, has been seen in the Forest since she was lost and left there. Two young harts got drowned on going to drink at a muddy place from which they were unable to extricate themselves. In 1881 we killed and ate a five-year old stag thus reared, and another last year. The heads of these are good average heads, and are now hung up in our hall. They have each of them ten points, and neither of them showed any signs of degeneracy that we could perceive. There are now (May 28th, 1887) five Red deer in Hatfield

Broad Oak Forest, all of them sprung, as we believe, from this solitary hind."

Cat attacked by a Swallow.—Whilst walking in my garden not long ago my attention was drawn to an unusual screaming of Swallows, and on turning around I perceived my little kitten looking very frightened and uncomfortable in the drive, about thirty yards from the house. To my surprise this was caused by a Swallow which swooped down several times and actually touched the Cat, making her jump round in a most ludicrous fashion. The movement of the bird was so rapid that I could not see if it touched the Cat with its beak or claws, but it certainly did with one or the other. Poor Puss seemed too startled to move at first (except simply to look round at the same spot), but eventually she fairly bolted with tail erect (after the manner of Cats when Tim the Terrier is after them), closely pursued by the Swallow until out of sight. I fetched Kitty again, and placed her on the same spot, but directly she heard the scream of the Swallow away she went as fast as her legs would carry her. I have often seen Swallows hover and heard them scream around a Cat, but never before saw one venture so close.—J. G. HAMLING (The Close, Barnstaple).

White Stoat in August.—I recently examined in the flesh a pure white Stoat (*Mustela erminea*), which was shot by Mr. J. S. Phillips, of Llandovery Court, Usk, on August 3rd, and forwarded by him with another of the normal colour to the Editor of 'The Field.' August 3rd is an unusually early date at which to find a Stoat in complete winter pelage, and in this case there was no trace anywhere of the brown colour which so often appears (even in mid-winter sometimes) in little patches on the head or back, the fur being of a uniform pale yellowish white. It was still further remarkable in having no black tip to the tail, a peculiarity which I have never before observed in any Stoat killed in this country, although such variation from the usual type, I believe, has been noticed occasionally in the northern parts of North America and Canada. In the specimen now referred to, which was one of average size, the eyes were not pink, but of the usual dark brown colour. It has been preserved for exhibition in the Natural History Museum, South Kensington.—J. E. HARTING.

Hedgehog eating Swedes. — My brother, the Rev. W. Bond, of Edgton Vicarage, Aston-on-Clun, Shropshire, writing to me on July 2nd, says:—"Another thing I have lately heard is news to me, but which I have no doubt is perfectly true, as I have heard it from two respectable persons. Directly opposite my house was a field of swede-turnips last winter. The farmer noticed that some animal was taking great liberties with them; thinking rabbits were the delinquents, he set some snares, but had no success. A small spinney runs along one side of the field, which the landlord reserves, and it is under the charge of a woodman. The farmer desired this man to set some steel traps (which are commonly used in these parts, notwithstanding the illegality), and in a very short space of time he caught over twenty Hedgehogs. After this no more turnips were eaten." I see that Bell says Hedgehogs will readily eat vegetable substances, and I know that tame ones will eat boiled potatoes and cabbage. Gilbert White, in his 27th letter to Pennant, observed that they eat the roots of the plantain in his grass-walks. If so, I do not wonder at their eating swede-turnips, which I fancy would be much more palatable.—F. Bond (5, Fairfield Avenue, Staines).

[With regard to plantain roots, the author of the 'Letters of Rusticus discovered that the destroyer was not the Hedgehog, but a night-eating caterpillar. See Harting's edition of White's 'Selborne,' p. 91, footnote.—Ed.]

A Badger in Birmingham.—It may interest some of your readers to know that a specimen of this comparatively rare animal was dug out of a hole recently in some sandhills in the neighbourhood of Chad Valley, Edgbaston, which is in the borough of Birmingham. It had been committing great depredations among the poultry for some time past, until its presence was at last suspected. A Fox was shot in the same locality last spring.—W. Harcourt Bath (Ladywood, Birmingham).

The Bats of Merionethshire.—Natterer's Bat, *Vespertilio Nattereri*, may be added to the species mentioned by Mr. Caton Haigh in the August 'Zoologist' (p. 293) as inhabiting this county, on the authority of the late Mr. Wm. Thompson, of Belfast, who took a specimen in the ruins of Harlech Castle in July, 1835, as recorded in his 'Natural History of Ireland' (vol. iv. p. 2), and in the Zoological Society's 'Proceedings' for 1837, p. 52.—J. E. Kelsall.

BIRDS.

Unusual Site for a Flycatcher's Nest.—A very similar occurrence to that mentioned by Mr. Darell Stephens (p. 306) came under my notice last year. In this case a pair of Spotted Flycatchers made a neat little nest inside an old Thrush's nest, which was placed on a horizontal bough of a beech about ten feet from the ground. I thought this so unusual and interesting that I made a sketch of it. When I left there were three fledged young ones in the nest.—G. E. Lodge (5, Verulam Buildings, Grays Inn).

Curious Capture of a Snipe.—On coming home from a drive one day in July last I was told a boy with some birds wanted to see me. On being sent up he said, "I have brought two young Snipe and an old one" (which he had in his hand). I said, "Is she hurt?" "No, not a bit, sir." "How did you get her?" "Well, I saw her with her two young ones in our garden. I caught the young ones and put them in a canary cage, and tied a piece of string to the door and hid myself: in about ten minutes she came, and after a bit went into the cage, and I pulled the door to." I gave him a shilling, saying, "Are you satisfied?" "Yes, sir." I replied, tossing the Snipe up, "So am I; and I am sure the Snipe is." The two young ones are now in Mr. O. V. Aplin's collection of birds in down.—J. W. WHITAKER (Rainworth Lodge, Notts).

Pied Puffin and Razorbill at St. Kilda.—Those of your readers who are interested in abnormal plumage may be glad to know that among the seafowl snared by the men of St. Kilda last June occurred a Razorbill and a Puffin, in each of which the upper parts were pied with white. This I learn from the late schoolmaster there, Mr. Murray, whom I first met on the island last year. Mr. Murray tells me that the Razorbill is the only pied specimen that has ever been taken at St. Kilda. "The pied Puffin," he continues, "is not such a rarity in St. Kilda. They see one or two pied Puffins every year. This one was killed on Boreray during the first week of June."—H. A. MACPHERSON.

[In 'The Zoologist' for 1872 (p. 3279) Lieut.-Col. Feilden, in an article on the Birds of the Færoes, remarks that white varieties of the Puffin are not unfrequently seen there. Two were in the collection of Herr Müller, and he saw a beauty in the flesh brought from the island of Naalsoe on the 17th June: it was pure white with black eyes, and one single black feather on the breast; the legs and bill were of the ordinary colour.—ED.]

Open Nests of the Starling, Stock Dove, and Tawny Owl.—A Starling's nest was found on May 5th at Gatton, in Surrey, in an ivied spruce-fir, some thirty feet up, the peculiarity of which was that it was a cup-shaped nest open to the sky. I never remember to have come across one like this before, though they are not unknown to the much greater birds'-nesting experience of Professor Newton, *cf.* Yarrell B. B. (4th ed. ii. p. 232, note). On an adjoining tree we found an open Stock Dove's nest, built like a Wood Pigeon's. All the Stock Dove's nests I have seen before were in holes. I have also seen three Tawny Owls' nests this summer which were quite open, one in the crotch of an oak, and two in the tops of the stumps of decayed broken alders; two of them were in Norfolk and one at Whitley, in Surrey.—J. H. GURNEY, jun. (Keswick Hall, Norwich).

[Two or three instances of Tawny Owl's eggs being found exposed to open view have come under our notice. Mr. C. B. Wharton some years ago found eggs of this bird laid on the top of a heap of fir-needles, only a foot or two from the ground.—ED.]

Attempt to keep the Sand Martin in confinement.—Whilst in Kent last July, a man brought me five young Sand Martins which he had just taken from their nest. The burrow from which they had been taken having been destroyed, and the birds themselves being too young to fly, I determined to do my best to keep them alive. The idea of giving them their natural food being out of the question, I mixed up for them a paste consisting of four parts fig-dust and pounded dog-biscuit, two parts pea-meal and yelk of egg, and one part ants' eggs; but it was quite a week before they would take this food from a feeding-stick, and the task of opening their mouths for every morsel was one which I should not care to repeat. After about ten days, all five fed themselves greedily from a small glass pot of food, and I then turned them into a large flight-cage, hoping that they would take sufficient exercise to keep them in health. In this, however, I was disappointed, for, although at first they took short flights and roosted high up on the perches, or rock-work, in the cage, they gradually spent more and more time in cramming their crops, and one by one they dropped off, until, at the end of the twenty-second day, the last of the five died. I may add that, although when first taken these young Sand Martins were beautifully clean, they so messed their faces with the soft food it was necessary to give them, that before they died all their beauty had departed.—A. G. Butler (Natural History Museum).

The Song of the Chaffinch.—At p. 299 *ante*, the Rev. H. A. Macpherson asks whether "our home Chaffinches are autumn songsters." Amongst a number of other British birds, I keep two Chaffinches, one of which was caught five years ago, and the other two years ago. They both recommence singing every year in August, and continue singing during the autumn, but they do not sing so freely as in the spring.—H. Goss (Surbiton Hill, Kingston-on-Thames).

The Song of the Chaffinch.—I have frequently heard the Chaffinch singing in the neighbourhood of Birmingham in the autumn. Throughout the mild winter of 1881 I heard it almost once a week on the average. It does not usually commence to sing with us until the end of February or the beginning of March. The Kestrel, Green Woodpecker, and Crow have recently been observed breeding in the borough of Birmingham.—W. Harcourt Bath (Ladywood, Birmingham).

Swifts nesting in Martins' Nests.—The following is an extract from a letter dated July 2nd, 1887, received from my brother, the Rev. W. Bond:—"Did you ever hear of Swifts nesting in Martins' nests? This year they have taken possession of some under the eaves of the vicarage (Edgton Vicarage, Aston-on-Clun, Shropshire), which appears to me a very unusual proceeding." I wrote for further particulars, suggesting that there might be a hole under the eaves of the roof, and on July 29th got the following reply:—"You will think me very lazy not answering your queries before about the Swifts. There is no mistake about it: there were two broods in Martins' nests, one of which has flown; the others are now being fed by the old ones, as any one may see who will watch for a few minutes. I mentioned the occurrence as I never heard of such a thing before."—F. Bond (5, Fairfield Avenue, Staines).

Plover's Nest with Five Eggs.—On reading Mr. Whitaker's note (p. 267), it reminded me of a Plover's egg which I took near here some sixteen or eighteen years ago. It was in a nest containing four other eggs of the ordinary Plover type, except perhaps that the ground colour of these eggs was somewhat lighter than usual, which made the smaller and darker egg look more conspicuous, for neither in form, markings, size, nor colour did it resemble any of them, being more ovate, having a brown ground colour with most of the darker markings collected about the smaller end, and the egg itself certainly not larger than that of a Song Thrush. An old collector, to whom I once showed it, said if he had not known its origin he would possibly have referred it to a variety of the Black Tern. I cannot, of course, affirm that all five eggs were laid by one and the same bird, but, as the Black Tern is sparsely distributed here as an autumnal visitor, I may positively say it is not referable to that species; and I see no reason why it should not be a small, abnormally-marked egg of the Plover, *Vanellus cristatus*, for we are well aware that sometimes where an unusual number of eggs are laid there is a marked difference in the size of what we suppose to be the *last* of the clutch, although in such cases the smaller egg has generally a family resemblance—at least, in colour—to its fellows.—G. B. Corbin (Ringwood, Hants)

[Would it not rather be the *first* of the clutch? The first eggs of pullets are usually smaller than those laid subsequently.—Ed.]

Fork-tailed Petrel breeding on Islands off Co. Kerry.—I announced last year in 'The Zoologist' (p. 367) that an egg of this species had been sent to me from the Blasquet Islands. I am happy to say that a bird with its egg has, at my request, been forwarded this summer from the same spot to the Science and Art Museum, Dublin, and I am informed by my friend Mr. Barrington that the specimen is *Procellaria Leachii*. He has moreover received this summer another egg of this species from the same island. It measures 1·31 by ·97 in. I have also recently received an egg, among others of the Storm Petrel, from the Great Skellig, which measures 1·21 by ·93 in. Though these dimensions are unusually small for eggs of the Fork-tailed Petrel, I have never known so large a size to be attained by eggs of the Storm Petrel, of which I have examined hundreds, and I should like to know if any reader of 'The Zoologist' can give an instance of a Storm Petrel's egg of this size. I have three eggs of the Storm Petrel which measure respectively 1·2 by ·84 in., 1·19 by ·88 in., 1·13 by ·9 in. Mr. Seebohm gives as the greatest length 1·2 in., and the greatest breadth ·86 in. I believe this egg from the Skelligs to be of the Fork-tailed Petrel, though the bird was not found with it, as in the former case. These are the first authentic records of this bird breeding on the Irish coast. It appears to do so in very small numbers, and only on the most outlying islands, for the three or four instances I have given are the results of careful and repeated searches which were entirely unproductive in a locality nearer the coast where the Storm Petrel breeds in large numbers.—R. J. Ussher (Cappagh, Co. Waterford).

Honey Buzzard in Dorset.—About June 2nd or 3rd a fine bird of this species was killed not very far from Wimborne, and I had the pleasure of examining it shortly afterwards. It is a very dark, rich-coloured specimen, weighed 1 lb. 10 ozs., and measured 25½ in. from beak to tip of tail. Its muscular feet and claws were very dirty, and it must have been scratching in the vicinity of cow-dung, as portions were attached to its otherwise dirty legs; in fact, the natural colour of both feet and legs was entirely hidden by the dirt. On dissection it proved to be female, as I had anticipated, and in the ovary I counted seventeen eggs, ranging from the size of a pin's-head to a hazel-nut. The two largest were about equal in size, and would have been, I supposed, the produce of the present season had the bird escaped destruction. Its crop contained very little, except two small grubs of some dipterous insects,—probably from the cow-dung, which it had been undoubtedly investigating,—but in its gizzard I found the remains of individuals of several orders of insects, amongst which the horny tail of the cockchafer and the pincer-like tail of the earwig were very conspicuous; beside this was a small quantity of vegetable matter, arising no doubt from the empty skins of three full-grown larvæ of *Plusia gamma* (silver-Y moth), the specific distinctness of which could be easily made out, although the caterpillar-skins were as empty and flaccid as if they had suffered great pressure. The action of the gizzard seemed to have had no more power over the skin of these caterpillars and the markings thereon than it had upon the horny appendages of the other insects, but probably time would have effected a change in both. It thus seems that the Honey Buzzard is an indiscriminate insect-feeder, taking the insect in every stage of its existence; and, since wasps and their grubs, together with dragon-flies, is a well-known food of this bird, it seems a great pity that amongst many of the game-preserving community it should be classed as "vermin," and killed as soon as discovered. I have been particular in describing what I found in the stomach, for the man who killed it wished me to understand that it was very destructive to his Partridges. It is interesting to note also that this bird did not reject caterpillars bearing short hair-like spines upon their bodies, as *gamma* does, for it is well known that some birds refuse larvæ unless smooth-skinned, whilst others, as the Cuckoo, are said to prefer those that are comparatively spinous.—G. B. Corbin (Ringwood).

Addition to the Avifauna of the Færoe Islands.—I am indebted to Mr. Edward Hargitt for handing over to me a portion of his specimens of birds collected in the Færoe Islands, and lately, when arranging them, I was pleased to discover in the collection two examples of the Bar-tailed Godwit, *Limosa lapponica* (Linn.), a species not hitherto recorded from the Færoe Islands; one, a male in breeding plumage, procured by Herr H. C. Müller near Thorshavn on the 14th of June, 1878; the other, in autumn plumage, but without note of sex, nor date of capture, obtained by the same gentleman on the Island of Stromoe. Whilst on the subject of birds from the Færoes, I may refer to the catalogue of a sale at Stevens's in Covent Garden on the 25th April, 1887, wherein lot 179 is described as a fine clutch (2) of Great Northern Diver, Faroes, 1880. Mr. Howard Saunders, who attended the sale, informs me that the eggs were unquestionably those of *Colymbus glacialis;* but I may point out that the locality given is doubtless an error, for the Great Northern Diver has never been known to breed in the Færoe Islands.—H. W. Feilden.

The Green Woodpecker an Egg-sucker.—We are well aware how readily a "bad name" attaches itself to any unfortunate object obtaining it, and thus it is with some degree of diffidence I make an accusation against the bird named, for it is a species giving such a marked characteristic to many of our woodlands in the South of England, that I should be sorry if any words of mine helped on the destruction of a single individual. Some two or three seasons ago a gamekeeper asked me if I knew that the Green Woodpecker was often as destructive to eggs as the Jay or Magpie, and that more than once he had seen a bird attacking his pheasants' eggs. I felt very sceptical on the point, and explained to him as well as I could that this species of Woodpecker often feeds upon ants and their pupæ, for which it naturally descended to the ground, and that often the beak of the bird was covered with dirt from the mere fact of its searching about and probing in the earth for such prey. No doubt many readers of this journal have seen this crimson-crowned forester scrutinising an ant-hill, thrusting in its bill to the utter confusion of the active inhabitants, and then securing, with its barbed and glutinous tongue, a plentiful meal of the ants as they ran hither and thither in their anxiety to protect the pupæ. Upon making enquiries of those who, by their occupation as woodmen, &c., would be likely to know anything of this subject of egg-stealing, I found that the majority seemed to be ignorant of the matter with regard to the bird in question, whilst a few spoke of it as well known. This season, however, I have had a more conclusive proof, *viz.*, about the beginning of May a woodman told me he had seen a Woodpecker rifling a nest, and I asked him if he could secure me a bird taken in the act of egg-sucking. During the month I received three specimens—all males—with the following results on dissection:—1. Beak and plumage of head very dirty; throat and crop containing what might have been the white of an egg. 2. Beak very dirty, plumage comparatively clean, but in the throat and stomach undeniable evidence of both white and yelk of egg. 3. Very clean, full-plumaged bird; stomach containing only a few ants and other insect-remains. Had I found no more conclusive evidence than in No. 1, I should have treated the whole story as a myth, attributing the fluid contained in the throat, &c., to an unusual quantity, and an abnormal condition, of the glutinous substance found naturally in the head and throat of this and allied species; but I know not how to argue in favour of No. 2, for in that case it seems to be "proven"; whilst in No. 3 the accusation is utterly disproved. Is it a recognised fact,—it was new to me,—or is it an acquired habit, something akin to the Kea's love for (living) mutton-fat (Zool. 1881, pp. 290—301)? for I should have mentioned that game-preserving is not carried on less keenly than it was some years ago in the locality where these birds were taken. I should be glad to know that egg-sucking is but a case of depraved appetite in a few individuals of the "Yaffingale," whose merry "laugh' forms so pleasant an accompaniment to a woodland ramble.—G. B. Corbin (Ringwood, Hants).

Dark Variety of Montagu's Harrier in Hants.—At the end of May I heard of "a black hawk" having been killed near here, and on enquiry I have not much hesitation in saying it was the dark variety of the above species, which has been obtained once or twice before in this locality. I did not see the specimen in question, but its occurrence is, I think, worth recording.—G. B. Corbin (Ringwood).

Egg-drills.—We have received from Mr. Marsden, of 37, Midland Road, Gloucester, two specimens of egg-drills—a small one sold at 6d., and a larger one at 10d.—which may be recommended. They are not so well finished as the one previously noticed (p. 236), but they are less expensive, and, being much shorter in length, are more conveniently carried by the egg-collector.

Notes from Western Australia.—As I believe this district has never been explored from an ornithological point of view, having been settled only ten years, perhaps some notes may be of interest to readers of 'The Zoologist,' though, when I have been here longer, I shall have more to say I trust. At present my camp is about twenty miles from the sea, and about twenty miles north of the River Gascoyne, which, owing to a long drought, has not run for three years. This spell of dry weather interferes with bird-life; many must have died of thirst, and stronger species moved to where there is water. The country may be described as a mass of scrub from two to ten feet high, with here and there sand-flats and clay-pans, where water holds when rain falls. Numerous shallow gullies intersect the country, and are fringed by the white or swamp gum tree (the only tree that grows here, and not to any great size). Near the sea are sand-hills and salt-marshes, which I have not yet explored at all. Coming down the coast last January I shot many interesting birds at Derby (King's Sound), but they were all swamped in the boat returning to the ship. Mutton-birds were very numerous all along, and at Cossack I saw and shot Ospreys. At Ashburton a fine Sea Eagle settled on the mast-head, but was not secured. The noble Wedge-tailed Eagle (*A. audax*) is numerous here, and very destructive to lambs: a good many have fallen victims to poison. It is a pity to destroy such fine birds, but I have seen a pair kill five lambs in one morning. Birds of prey are very plentiful, but as yet I have not commenced to shoot for skins, the birds being in bad feather this time of year, and I want to secure them with their eggs. Emus are seen almost daily, in spite of the drought, and, from a specimen I examined on March 23rd, I think Gould is correct in surmising that the Spotted Emu is the bird of Western Australia (*Dromæus irroratus*). This was a female, and contained a large cluster of eggs, some as large as a duck's. March 25th no less than twenty-eight were seen in one flock near a pool, many last year's birds not full-grown. The Western Long-billed Cockatoo (*Licmetis pastinator*) is seen in large flocks. I have only Gould's 'Handbook' to work from, but have seen and shot several of the following species, which he describes as only being found in the interior:—Rose-breasted Cockatoo (*C. roseicapilla*), the Varied Parrakeet (*Psephotus multicolor*), and the Crested Bronze-wing Pigeon (*Ocyphaps lophotes*). The Yellow-collared Parrakeet (*P. semitorquatus*) is common, as are others of this genus I have not yet identified. A flock of Black Swans were on a pool here April 2nd, which I take to be a long way north for this species; they were in company with Avocets, Pelicans, Pink-eyed Duck, Australian Teal, and other wildfowl. The Australian Curlew is very common, and a noisy bird at night. When winter sets in, and we get rain, I hope to be able to send some fuller and more interesting notes.—T. CARTER, of Masham, Yorkshire (Boolathana Station, Gascoyne, Western Australia).

REPTILES.

Coloration of the Viper.—With reference to the remarks of Mr. Macpherson under this heading (p. 306), it may be well to point out that the Viper which occurs in the Forest of Fontainebleau is *Vipera aspis*, and not the British Viper, *Vipera berus*. The characters by which these two species may be distinguished will be found indicated by Mr. Boulenger in 'The Zoologist' for 1885, p. 375.—J. E. HARTING.

FISHES.

"Becker" or "Braise" in Cornwall.—On August 3rd I took, in my trammels, a "Becker" or "Braise." There exists considerable doubt whether this fish is distinct from the Spanish Bream, but, having now taken several specimens, I am convinced, from its shape, its peculiar dentition, its lustrous colours when alive, and, above all, from the quality of its flesh, that it is distinct. I do not regard the "Becker" as a rare fish. Every summer I see some hawked round our streets and sold as common Sea Bream, but any one who is offered a short Sea Bream, with a red-bronze back and a yellow-bronze belly, and with no spot over the pectorals, will do well to buy it at the fishwoman's price. He will have secured the "Becker"; and, when he has stewed it in milk with shreds of parsley, he will eat a fish superior to Turbot.—T. Cornish (Penzance).

MOLLUSCA.

Middlesex Mollusca.—The following Mollusca were taken by me in the neighbourhood of West Drayton, Middlesex, on the 30th May last:—*Sphærium corneum*, *S. rivicola*, *Pisidium fontinale*, *P. pusillum*, *Unio pictorum*, *Anodonta anatina* (and var. *radiata*), *Neritina fluviatilis*, *Paludina vivipara*, *Bythinia tentaculata*, *B. Leachii*, *Valvata cristata*, *Planorbis vortex*, *P. complanatus*, *P. corneus*, *P. contortus*, *Physa fontinalis*, *Limnæa peregra* (and var. *ovata*), *L. stagnalis*, *L. palustris* (and var. *tincta*), *L. truncatula*, *Ancylus fluviatilis*, *Arion ater*, *A. hortensis*, *Limax agrestis*, *L. lævis*, *Succinea Pfeifferi*, *S. putris*, *Zonites nitidus*, *Z. crystallinus*, *Z. fulvus*, *Helix aspersa*, *H. nemoralis*, *H. hortensis*, *H. arbustorum*, *H. cantiana*, *H. rufescens*, *H. concinna*, *H. sericea*, *H. rotundata*, *Cochlicopa lubrica* (and var. *alba*), *Carychium minimum*, and *Vertigo pygmæa*.—S. C. Cockerell (Bedford Park, Chiswick).

CEPHALOPODA.

Hawaiian mode of fishing for Octopus.—The United States Fish Commission in one of their Bulletins furnish an excellent report by Mrs. Emma M. Beckley, Curator of the Hawaiian National Museum, on "Hawaiian Fishing Implements and Methods of Fishing." The writer gives some curious details about Octopus-fishing. The smaller kinds of Octopus, which live in shallow water, are caught by women, who do their work with remarkable skill. They can tell whether an Octopus is in a hole whose entrance is no larger than a silver dollar, and, plunging their spears in, they invariably draw one out. The larger kinds of Octopus, which are always found in deep water, are caught by men with cowries, generally of the Mauritiana, but sometimes of the tiger species. An Octopus will not rise to a large-spotted or ugly cowry, so the fishermen have to take care that the spots on the back of the shell are very small and red, breaking through a reddish-brown ground. Cowries with suitable spots, but objectionable otherwise, are slightly steamed over a fire of sugar-cane husks, a process which gives them the desired hue. The fisherman, having arrived at his fishing-grounds, first chews and spits on the water a mouthful of candle-nut meat, which renders the water glassy and clear; he then drops the shell with hook and line into the water, and swings it over a place likely to be inhabited by an Octopus. The moment an Octopus perceives a cowry, it shoots an arm out and clasps the shell. If the shell is of the attractive kind, one arm after another comes out, and finally the whole body of the Octopus is withdrawn from the hole and attaches itself to the cowry, which it closely hugs, curling itself all around it. The creature remains very quiet while being rapidly drawn up through the water. Just as it reaches the surface, the fisherman pulls the string so as to bring its head against the edge of the canoe, and it is killed by a blow from a club which is struck between the eyes. This must be done rapidly, before the animal has time to become alarmed; for if it lets go the cowry it becomes a dangerous antagonist, and there is risk of the fisherman being squeezed to death. The cutting off of one or more of its eight arms does not affect the rest in the least.

INSECTS.

Craneflies preyed upon by Gulls and Terns.—When dissecting a mature Lesser Black-backed Gull, *Larus fuscus*, on the 15th August, I found the stomach and throat crammed full of the common Cranefly, *Tipula longicornis*. When taken out of the bird's crop they weighed one ounce and a half, so I thought the fact worth mention.—C. BRAZENOR (Brighton).

[We have often observed the Black-headed Gull, *Larus ridibundus*, and the Common and Black Terns, *Sterna fluviatilis* and *nigra*, catching Craneflies on the wing, on a still summer evening, when these insects were flying in clouds near the water.—ED.]

Retirement of Mr. A. G. More.—Mr. A. G. More, F.L.S., M.R.I.A., a long and valued contributor to 'The Zoologist,' has unfortunately been obliged, owing to ill health, to resign his appointment as Curator to the Natural History Department of the Science and Art Museum, Dublin. Before he went to Ireland Mr. More had written an account of the Fauna and Flora of the Isle of Wight in Canon Venables' Guide to that Island, and had also published an important series of papers "On the Distribution of Birds in Great Britain during the Nesting-season" in 'The Ibis' for 1865. The central idea of cataloguing the nesting-places of birds was his own, and the working of it out involved an immense amount of labour. On first going to Ireland Mr. More originated the idea of producing a Flora of Ireland. This he accomplished by putting in writing and critically examining the great store of facts which the late Dr. D. Moore had accumulated in his memory. The 'Cybele Hibernica' was then published, and well supplied a long-felt want. Mr. More is at present engaged on a new edition of that valuable work. In 1867 Mr. More was appointed as Assistant in the Museum of the Royal Dublin Society, and the pages of 'The Zoologist' and 'Ibis,' and other journals testify to his activity in investigating the Flora and Fauna of Ireland. A few of his more important additions to the Fauna may be here noted:—In company with Mr. Wm. Andrews he found the first Irish specimens of Montagu's Blenny, *Blennius galerita*, at Dingle and Connemara ('Zoologist,' 1878, p. 297). In 1875 he summarised what was known concerning the occurrence of gigantic Squids in Ireland ('Zoologist,' 1875, pp. 4526 and 4569). The form from Boffin Island which he identified as *Architeuthis dux* and the one he described as *Dinoteuthis proboscideus*, n. g. and sp., have since been recognised by Verrill as being specimens of *A. monachus*. In 1881 (Zool. p. 334) the Dusky Shearwater, *Puffinus griseus*, from Co. Kerry and *Falco islandus* from Belmullet (p. 488) were added to the Irish list. He recorded the Cape Pigeon, *Daption capensis*, as a straggler in Co. Dublin in 1882 ('Ibis'), but has now some doubt as to the honesty of his informant. The Spinous Shark, *Echinorhynchus spinosus*, was first recognised by Mr. More as Irish, from the Dublin coast (Zool. 1882, p. 434), and again from Galway Bay (Zool. 1885, p. 311). In 1885 he certified to the occurrence of the Wood Sandpiper in Wicklow (Zool. p. 438). In 1885 Mr. More completed 'A List of Irish Birds, showing the Species contained in the Science and Art Museum, Dublin," this being the first of a series of official Guides published by the Museum. This year he produced 'A Guide to the Mammals and Birds of the Museum. On several occasions Mr. More has made dredging excursions to various parts of the coast of Ireland, the results of which may be seen in the above Museum. A list of his published notes and papers, or an examination of the Museum under his charge, would not give a complete view of the activity of his mind. His numerous friends and correspondents can tell of his readiness to impart information and to suggest lines of enquiry. His critical knowledge of British plants and birds was continually being tested by local naturalists, and not a few of the papers recently published on the Flora and Ornithology of Ireland owe their origin or their value to his ability. Mr. More's large circle of friends will be pleased to learn that, although no longer connected with the Museum, he will still continue to reside in Dublin; and his house, like his room in the Museum in the past, will we hope continue for many years to be the rendezvous of all those interested in Irish Natural History.

SCIENTIFIC SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.

August 3, 1887.—Dr. D. SHARP, President, in the chair.

Mr. John Witherington Peers, M.A., of Wendover, near Tring; and Mr. R. G. Lynam, of the North Staffordshire Infirmary, Stoke-on-Trent, were elected Fellows of the Society.

Jonkeer May, the Dutch Consul-General, exhibited a pupa and two imagos of *Cecidomyia destructor* (Hessian Fly), which had been submitted to him for exhibition by the Agricultural Department.

Mr. W. White exhibited, and made remarks on, a specimen of *Philampelus satellitia*, Linn., from Florida, with supposed fungoid excrescences from the eyes. Mr. Stainton said he was of opinion that the supposed fungoid growth might be the pollinia of an Orchis. Mr. Poulton expressed a similar opinion, and the discussion was continued by Mr. Pascoe, Dr. Sharp, and others.

Mr. White also exhibited a specimen of *Catephia alchymista*, bred from a pupa collected by Mr. Ralfe last autumn on the South Coast.

Mr. M'Lachlan sent for exhibition a number of oak-leaves infested by *Phylloxera punctata*, Lichtenstein, which he had received from Dr. Maxwell Masters, F.R.S.

Mr. Champion exhibited two rare species of *Curculionidæ* from the Isle of Wight—*viz.*, one specimen of *Baridius analis*, and a series of *Cathormiocerus socius*. He remarked that *C. maritimus*, Rye, had been placed in recent European Catalogues as a synonym of the last-named species, but that this was an error. He also exhibited a series of *Cicindela germanica*, from Blackgang, Isle of Wight.

Mons. Alfred Wailly exhibited, and made remarks on, a number of living larvæ of *Antheræa pernyi*, *A. mylitta*, *Telea polyphemus*, *Platysamia cecropia*, *Actias luna*, *Attacus cynthia*, *Callosamia promethea*, and other silk-producing species. He also exhibited imagos of the above species, imagos of *Antheræa Yama-mai*, and a number of species of Diurni from Sarawak.

Mr. Poulton exhibited crystals of formate of lead obtained by collecting the secretion of the larva of *Dicranura vinula* on 283 occasions. The secretion had been mixed with distilled water in which oxide of lead was suspended. The latter dissolved, and the acid of the secretion being in excess the normal formate was produced. Prof. Meldola promised to subject the crystals to combustion, so that their constitution would be proved by the final test.

Mr. Oliver Janson called attention to Mr. Pryer's new work, 'Rhopalocera Niponica,' and to the fact that the illustrations had been executed by Japanese artists.—H. Goss, *Hon. Secretary*.

NOTICES OF NEW BOOKS.

Rough Notes on the Birds observed during Twenty Years' Shooting and Collecting in the British Islands. By E. T. BOOTH. With Plates from Drawings by E. NEALE, taken from Specimens in the Author's possession. Part XV. and last; folio. London: R. H. Porter. 1887.

COMMENCED in 1881, and issued at intervals in parts, the recent appearance of Part XV. has brought this fine work to a conclusion. As the author tells us in his Introduction, more years than he anticipated have been spent in describing the habits of the birds observed by him, and it would now be more correct to name twenty-five years instead of twenty as the period over which his observations have extended. The public have been the gainers, for the result is a collection of the most interesting and valuable notes relating to many of the rarer British birds which are not to be found elsewhere.

The concluding part, which is now before us, deals with the Snow Bunting, Bittern, Common Sheld Duck, Wigeon, Mallard, Dunlin, Ruff, and Common Tern, containing in addition the title-pages, contents, and list of plates for the three volumes in which the work may now be bound.

The illustrations by Mr. Neale from specimens in the author's collection, although perhaps somewhat unequal in merit as regards drawing, are accurately coloured, and have this great recommendation, namely, that in many cases several plates are given of the same species in different phases of plumage, many of which have not been previously represented in any other work. As examples, we may note the plates which represent the immature plumage of the Osprey, Kite, Hen Harrier, Montagu's Harrier, Bearded Tit, Yellow Wagtail, Ruff, Whooper, Shoveller, Eider, Velvet Scoter, Gannet (six plates), and Sandwich Tern, besides several Gulls, and eight plates of Skuas in various plumages. Another noticeable feature in the plates is the care that has been taken to reproduce accurately the colours of the soft parts in the species figured. These colours, as everyone knows, fade very quickly after death, and by the time a preserved specimen is thoroughly dried, the colours of the bill, legs and feet have completely changed in the process. It is therefore of importance that they should be accurately noted before the bird has been skinned. This Mr. Booth has been careful to do.

As regards the value of the letterpress we cannot speak too highly. Especially interesting are his notes on the nesting habits of our rarer birds, particularly those which, like the Osprey, Kite, and Hen Harrier, have almost ceased to breed in the British Islands, or those which, like the Brambling, have been found to do so on very rare occasions. It must be admitted that Mr. Booth has enjoyed remarkable facilities for exploring out-of-the-way places in search of the nests of what may be termed out-of-the-way birds. He has, in fact, gone straight to the haunts wherein they were most likely to be discovered, and in nine cases out of ten he has succeeded in finding them.

Now and again he has been doomed to disappointment, as, for instance, in the case of the Snow Bunting. In July, 1876, he tells us, he made an attempt to reach the ground on the summit of the high hills in the east of Inverness where the Snow Bunting is supposed to breed; a dreadful storm of wind and rain, however, put a stop to his advance, and rendered it an impossibility to reach the haunts of these birds. He thus graphically describes the situation:—

> "Having settled to search Ben Muich Dhu for Snow Buntings, we decided on making an early start, and leaving the lodge at midnight, we drove to a bothy on the east side of the forest. Here four keepers and foresters were awaiting our arrival, and an immediate start was made for the high ground. The morning proved dull and gloomy, and we were well up the Braemar Pass before it became fairly light. The weather then got worse, and the wind increased, the mist and clouds rolled lower down the hills, while the rain drifted in blinding showers, rendering it impossible for us to advance. For two hours we sheltered among some large slabs of rock near the highest part of the Pass in hopes that the storm might moderate. At length, however, we came to the conclusion that it was useless to attempt to reach the high ground; added to which the position we now found ourselves in could scarcely be termed pleasant. The terrific gusts as they roared round the crags above us now and then dislodged stones and pieces of rock that came rolling down the side of the hill. Some of these dashed past us at no great distance just after we had quitted our shelter, and I must confess I felt greatly relieved when we emerged from the Pass; the unearthly howling and screeching of the wind among the jagged and

> pointed rocks was perfectly deafening, and the force of the blasts was such that it would have been the height of folly to have proceeded further."

The account given of the habits of the Ruff and Reeve, as observed in one of its last breeding-haunts in Norfolk, is very entertaining. So also are the remarks which follow about Terns. Writing of the last-named birds, Mr. Booth says:—

> "Many of the breeding stations to which the Common Tern resorted in former days have been deserted. These birds are stated to have reared their young in considerable numbers on several of the wide-stretching shingle banks along the coasts of Kent and Sussex; I doubt, however, if a single egg has been laid on several of their former haunts in this locality for some years. Common and Arctic Terns not unfrequently breed in company. * * * The only species I was unable to identify on the Farne Islands were the Sandwich and Arctic, with the exception of a single Roseate Tern [which was procured]. I was not then aware that the Common Tern had been stated by several authors to nest on these islands; not a single specimen, however, was observed. * * * From repeated observations concerning the nesting habits of Terns, I am of opinion that the Common Tern usually lays three, and the Arctic Tern invariably four eggs."

The remarks on the migration of Terns in spring and autumn as observed by the author (too long to be quoted here) will, we are inclined to think, be new to many. Indeed, did space permit, there are many pages in the last part of the work now before us from which we should like to make extracts.

But, as we have intimated on former occasions when noticing the progress of this work, Mr. Booth's 'Rough Notes' should be in the hands of every ornithologist to be perused at leisure. Especially should it be studied by those who are pleased to assert that British Ornithology is "played out," and that there is nothing more to be learnt on the subject. We venture to think they will find in these pages a very great deal that they did not know before, and of which most probably they never dreamed. Mr. Booth is candid enough to tell us of his failures as well as his successes, and young and ardent ornithologists would do well to profit by his varied and pleasantly told experience.

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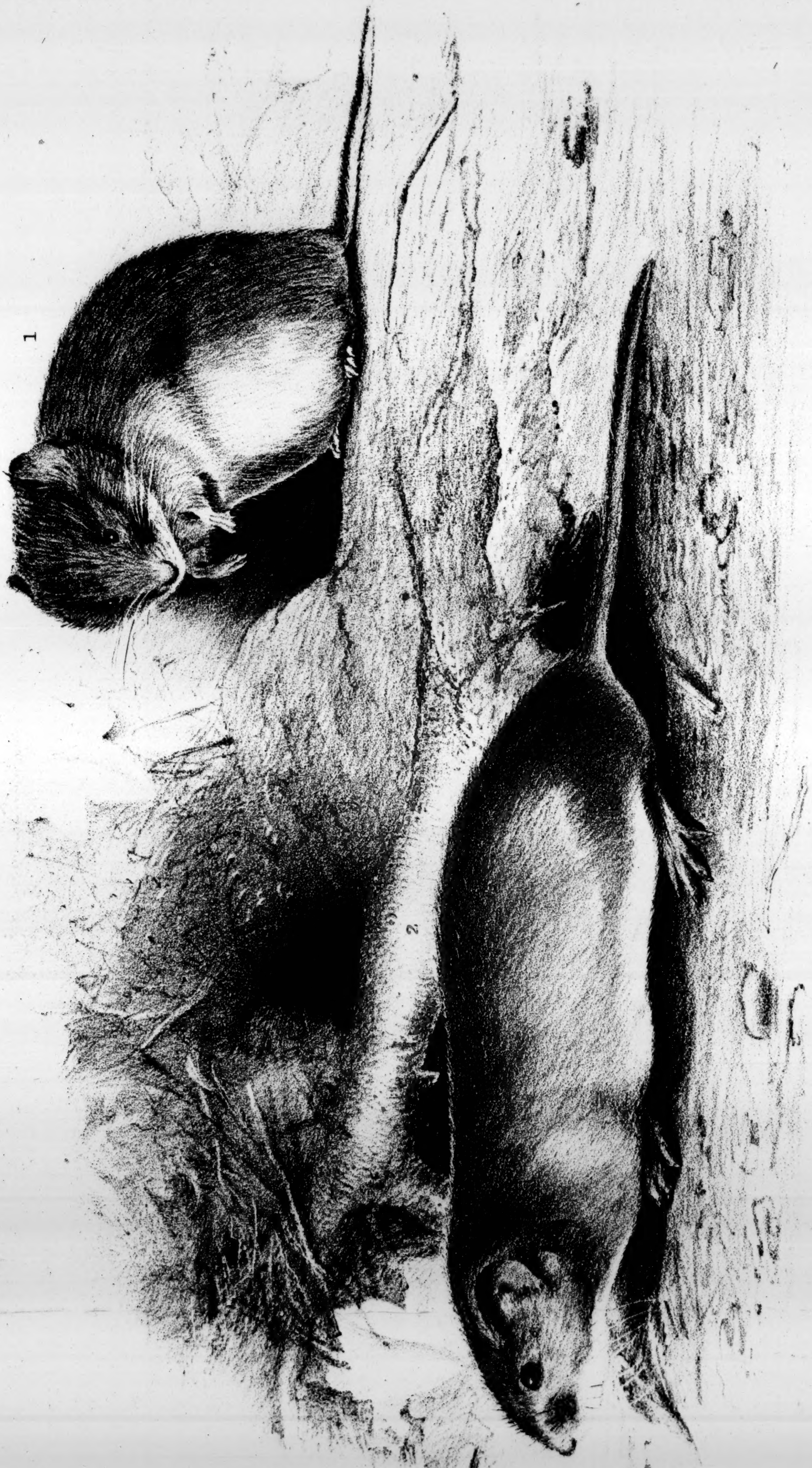

The Bank Vole. *Arvicola glareolus.*

West, Newman & Co. imp.